THE JOHNSON COMPANY, INC.

Environmental Sciences and Engineering

June 2, 1998

Mr. Charles Schwer
Vermont Sites Management Section
Department of Environmental Conservation
103 South Main Street
Waterbury, Vermont 05671

Re: Vermont Site # 97-2289. Summary of Groundwater Investigation and Sampling, Parrish Residence, Peru Vermont.
JCO # 1-1669-1 (042)

Dear Mr. Schwer:

The Johnson Company has completed a groundwater sampling investigation at the above-referenced site in Peru, Vermont. The results of this investigation demonstrate no groundwater impacts from a former underground storage tank (UST) that was taken out of service October 1997.

Please contact me at (802) 229-4600 with any questions or comments.

Sincerely,

THE JOHNSON COMPANY, INC.

By: Jim Bowes
James R, Bowes, CPG
Senior Scientist

and

By: Harriet Johnson for
Thomas Osborne
Project Scientist

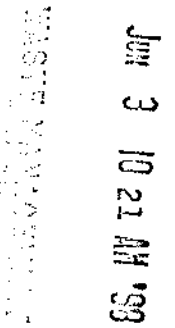
enclosure

cc: Alan Parrish

j:\projects\1-1669-1\gwinvest.rpt

Summary of Groundwater Investigation and Sampling

June 1998



SMS Site #97-2289

Prepared for:

ALAN PARRISH
120 Pulpitt Hill Road
Amherst, MA 01002

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering

100 State Street, Suite 600
Montpelier, Vermont 05602
802.229.4600/Fax 5876

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ATTACHMENTS

EXECUTIVE SUMMARY

The Johnson Company, Inc. (Montpelier, Vermont) has completed a groundwater sampling and investigation at the Parrish residence, Peru, Vermont (the Site). The Site is a private residence, used on a part time basis, and located on Russell Road, in Peru (see Site Location Map). The Site was designated an "active Site" and listed on the Vermont Sites Management Section's (SMS) Active Sites List (Site #97-2289) on the basis of elevated photoionization detector (PID) readings reported during closure and assessment performed by others of a 500 gallon underground fuel storage tank (UST) in October 1997. The Johnson Company performed a soil investigation in December 1997 and concluded the following: based upon results of laboratory analyses of soil samples collected adjacent to the UST; and, PID screening and visual observations of groundwater in the immediate vicinity of the UST; that no soil impacts and/or groundwater impacts had occurred. The SMS responded with a request to further evaluate groundwater at the Site via laboratory analyses of groundwater for total petroleum hydrocarbons (TPH), and benzene, ethylbenzene, toluene, and xylenes (BTEX). A work scope and cost estimate were presented to SMS April 27, 1998 since all work on the Site has been performed under the auspices of the Vermont Petroleum Cleanup Fund (PCF). The SMS approved of the scope and costs on April 28, and the Site work was done May 6, 1998.

Potential receptors in this vicinity were identified in addition to soil and groundwater, private drinking water supplies. The nearest water supply well was identified as a well located approximately 500 feet northeast of the Parrish residence. Four groundwater samples were collected from Temporary Monitoring Wells (TMWs) installed on the Site using our hydraulic power auger (LilBeavr®). In addition, a surface water sample was collected immediately downgradient from the UST. Results from the laboratory analyses as reported by Eastern Analytical Laboratories, Inc. (Concord, New Hampshire) did not detect the presence of TPH above the detection limit of 0.5 milligrams per Liter (mg/L) via Environmental Protection Agency (EPA) Method 8100 . Additionally, none of the tested locations were reported with BTEX and methyl tert butyl ether (MTBE) above the EPA Method 8021B detection limits (1, and 10 micrograms per Liter, respectively). Depths to groundwater ranged from 0.1 to 1.16 feet below ground surface. The groundwater, as measured May 6, 1998 flows eastward at a hydraulic gradient of 0.1 feet/foot.

Pending confirmation that the UST is permanently closed in place, The Johnson Company recommends that this Site be designated with the Sites Management Activity Complete (SMAC) status, and it be removed from the list of Active Sites maintained by SMS.

1.0 INTRODUCTION

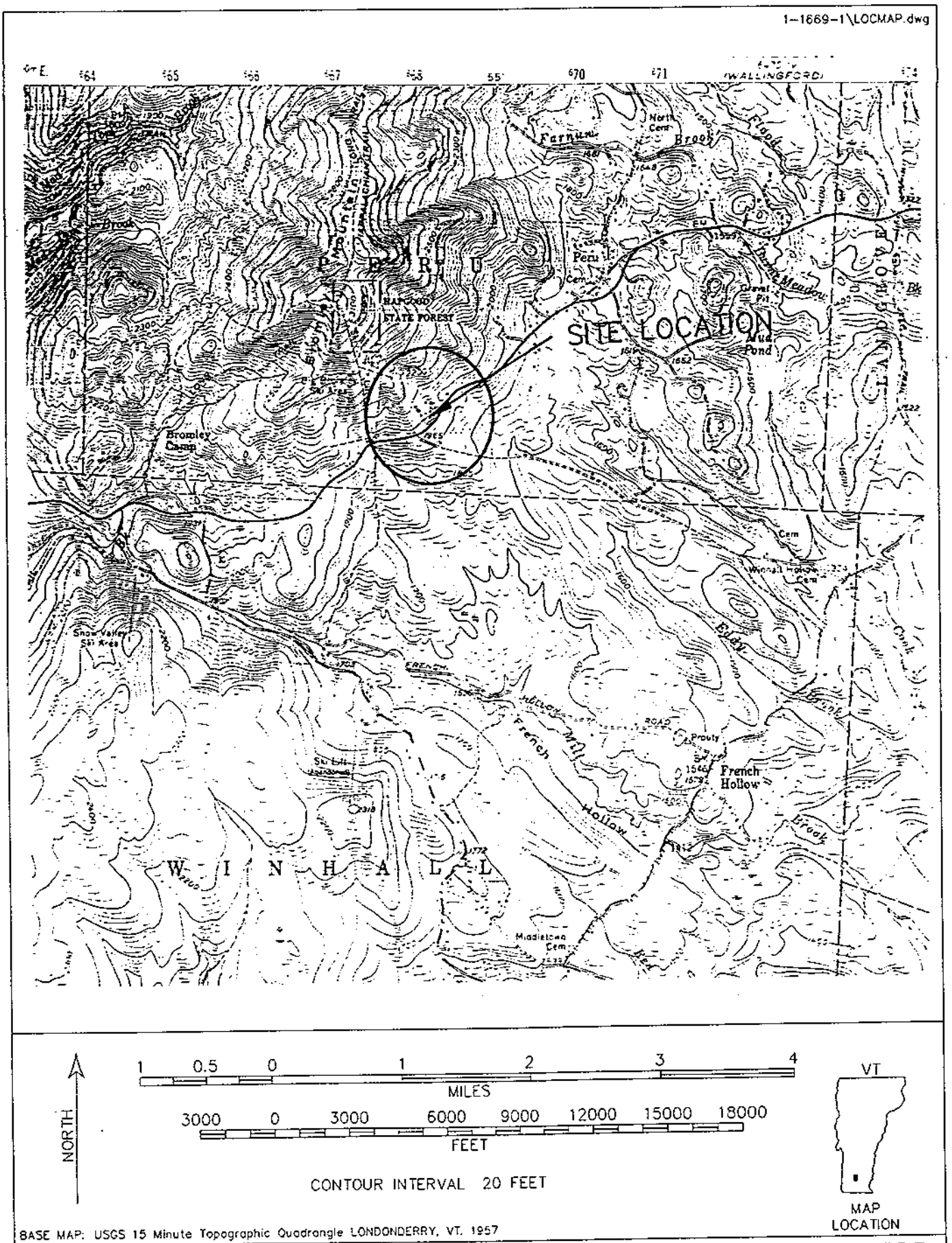
The Johnson Company, Inc. (Montpelier, Vermont) has completed a groundwater sampling and investigation at the Parrish residence, Peru, Vermont (the Site). The Site is a private residence, used on a part time basis, and located on Russel Road, in Peru (see Site Location Map).

The performance of a groundwater sampling program was requested by the Vermont Department of Environmental Conservation's Sites Management Section (SMS) after their review of The Johnson Company Report titled "*Site Investigation Report of Alan Parrish Property*", dated January, 1998. Since all work is being done under the auspices of the Petroleum Cleanup Fund, a work plan and cost estimate were generated for SMS on April 27, 1998. SMS approved of the scope and costs on April 28, 1998. The groundwater investigation was conducted May 6, 1998.

2.0 BACKGROUND

The Site is underlain by unconsolidated deposits mapped as till (Stewart, McClintock, 1970). Beneath the basal till is bedrock mapped as pre Cambrian (>600 million years) gneissic rock. During this, and the December 1997 site work, The Johnson Company encountered refusal at certain locations within 5 feet of the ground surface, evidence of a thin soil cover here.

Receptors to the suspected fuel contamination were characterized as potentially groundwater, and as such, an on-site survey of the nearest drinking water supplies was done during the May 6 work. The closest water supply well that serves the Parrish site is located approximately 500 feet cross gradient from the under ground storage tank. There is a second water supply well located up gradient approximately 800 feet from the Parrish residence.



SITE LOCATION MAP
ALLAN PARRISH – RUSSEL ROAD
PERU, VERMONT

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering
100 STATE STREET MONTPELIER, VT 05602

Figure 1

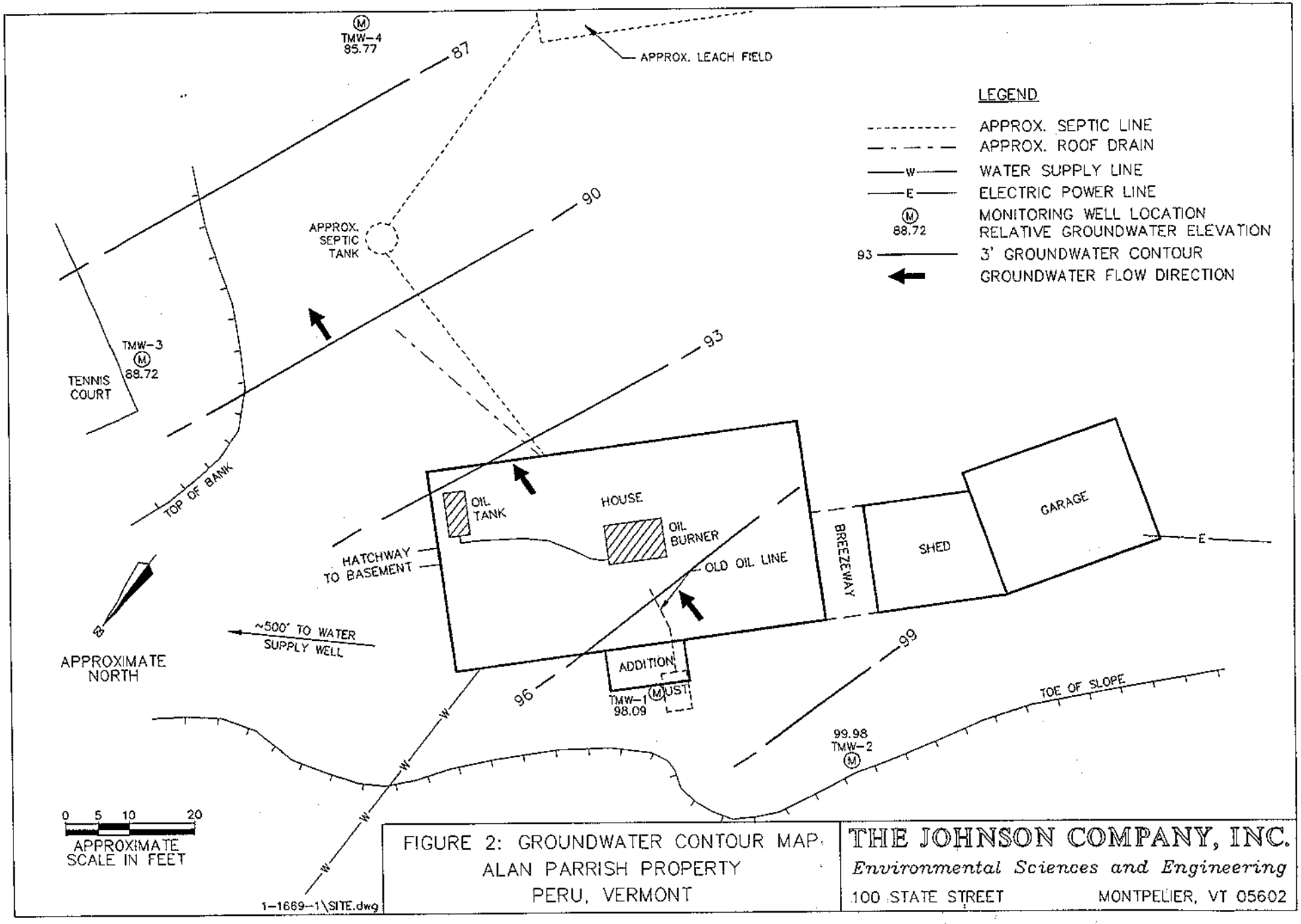


FIGURE 2: GROUNDWATER CONTOUR MAP
ALAN PARRISH PROPERTY
PERU, VERMONT

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering
100 STATE STREET MONTPELIER, VT 05602

3.0 INVESTIGATION

3.1 TEMPORARY MONITORING WELLS

Temporary Monitoring Wells (TMW) 1,2,3, and 4 were installed May 6, 1998 into soil borings advanced using the Little Beaver® gas powered hydraulic, solid stem auger. Locations were sited for the purpose of installing temporary monitoring wells for groundwater sampling as follows: two locations down gradient of the underground storage tank (UST); a location along side of the UST (cross gradient); and a location up gradient of the UST. The Site Sketch map in Figure 2 shows locations of the TMWs.

Two attempts were made immediately down gradient of the UST to intercept the water table, however, these were unsuccessful due to refusal on bedrock. Two additional soil boring locations were established further downgradient, and groundwater was encountered. These locations were named TMW-3, and TMW-4, and were located approximately 100 feet down gradient from the UST location (Figure 2). A third location (TMW-2) was established up gradient from the UST to help characterize groundwater quality as it migrates onto the Site. A fourth location (TMW-1) was established along side the UST with the solid stem augers to a depth of 4.5 feet bgs. All TMWs were constructed of 2 inch PVC, with factory slotted screens (0.010 inch slot).

A summary of the well construction details is listed in Table 1. Complete well construction logs are provided in Attachment A.

TABLE 1
SUMMARY TABLE - TEMPORARY MONITORING WELLS
PARRISH RESIDENCE, MAY 6, 1998

Location	Depth	Top of Screen	Bottom of Screen	Stick Up
TMW-1	5.0	Fully Screened	5.0	1.4
TMW-2	5.0	Fully Screened	5.0	3.3
TMW-3	2.6	Fully Screened	2.6	0.75
TMW-4	5.0	Fully Screened	5.0	1.6

3.2 GROUNDWATER HYDRAULICS

Initial water levels were collected immediately after installing the wells, then each well was developed by means of purging using a dedicated bailer and allowed to recover before collecting a second set of depth to water readings, and water quality samples. The Johnson Co's auto level was utilized to survey in the TOC elevations for all the wells for the purpose of establishing relative groundwater elevations for each well location and for the construction of a groundwater contour map for determination of flow direction, and hydraulic gradient. Table 2 summarizes the water level, TOC, and relative ground water elevations calculated for each TMW.

TABLE 2
WATER LEVEL READINGS
May 6, 1998

Location	TOC[1]	Depth to Groundwater (Feet BTOC)[2]	Relative Groundwater Elev. (Feet)
TMW-1	100.34[1]	2.25[1]	98.09
TMW-2	103.38	3.40[1]	99.98
TMW-3	89.68	0.96[1]	88.72
TMW-4	88.53	2.76[1]	85.77

1. TOC = Top of Casing. The TOC elevation is assumed, and referenced to an assumed temporary bench mark (TBM) elevation of 100 feet.
2. BTOC - Below Top of Casing

The contour map (Figure 2) demonstrates the groundwater flow direction proceeds east-southeast at a hydraulic gradient of 0.10 ft/ft.

3.3 WATER QUALITY SAMPLING

Groundwater samples were collected from each of the TMWs, and in addition, from a surface water body immediately adjacent to the former UST. The samples were collected using a dedicated PVC bailer for each well. The sample group was packaged chilled on ice for shipment under chain of custody to Eastern Analytical Laboratories in Concord, New Hampshire (EAL) for analyses for volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH) by Environmental Protection Agency (EPA) Methods 8021B and EPA 8100, respectively. EAL received the sample group in good order on May 8, 1998. The Johnson Company received EAL's report on May 20, 1998.

3.3.1 *Laboratory Results*

Of the samples submitted for analyses, none were reported by EAL with detectable concentrations for either TPH (at a limit of detection of 0.5 mg/L), or benzene, toluene, ethylbenzene, xylenes (BTEX) and methyl-tert butyl ether (MTBE). The analytical detection limits for the EPA 8021B analyes ranges from 10 micrograms per liter (μg/L) for MTBE to 1 μg/L for BTEX.

The complete analytical report is included as Attachment B of this report.

4.0 CONCLUSION AND RECOMMENDATION

- The underlying stratigraphy beneath, and in the abutting area of the Parrish residence is dominated by basal till, as a thin cover over bedrock, with estimated depth to bedrock varying from 1.5 to 5 feet;
- Depth to groundwater beneath the Site ranges from approximately 0.1-1.2 feet below ground surface;
- Groundwater flow direction is toward the south-southeast; at a gradient of 0.10 feet/foot (based upon May 6, 1998 measurements);
- No groundwater impacts have occurred on this Site as indicated by detectable concentrations of TPH, BTEX and MTBE in groundwater from sample locations placed such that if a release had occurred to the extent that groundwater had been impacted, these locations would have detected these compounds.

The Johnson Company recommends that no further actions be undertaken on the Parrish residence, with the exception that the UST now be permanently closed by infilling with sand. Upon completion of the UST infilling, this Site should be designated the Sites Management Activity Complete (SMAC) status, and removed from the list of active hazardous waste sites maintained by the SMS.

Attachment A

Well Logs

The Johnson Company, Inc.
Environmental Sciences and Engineering
100 State Street
Montpelier, Vermont 05602

DRILLING LOG
WELL # TMW-1

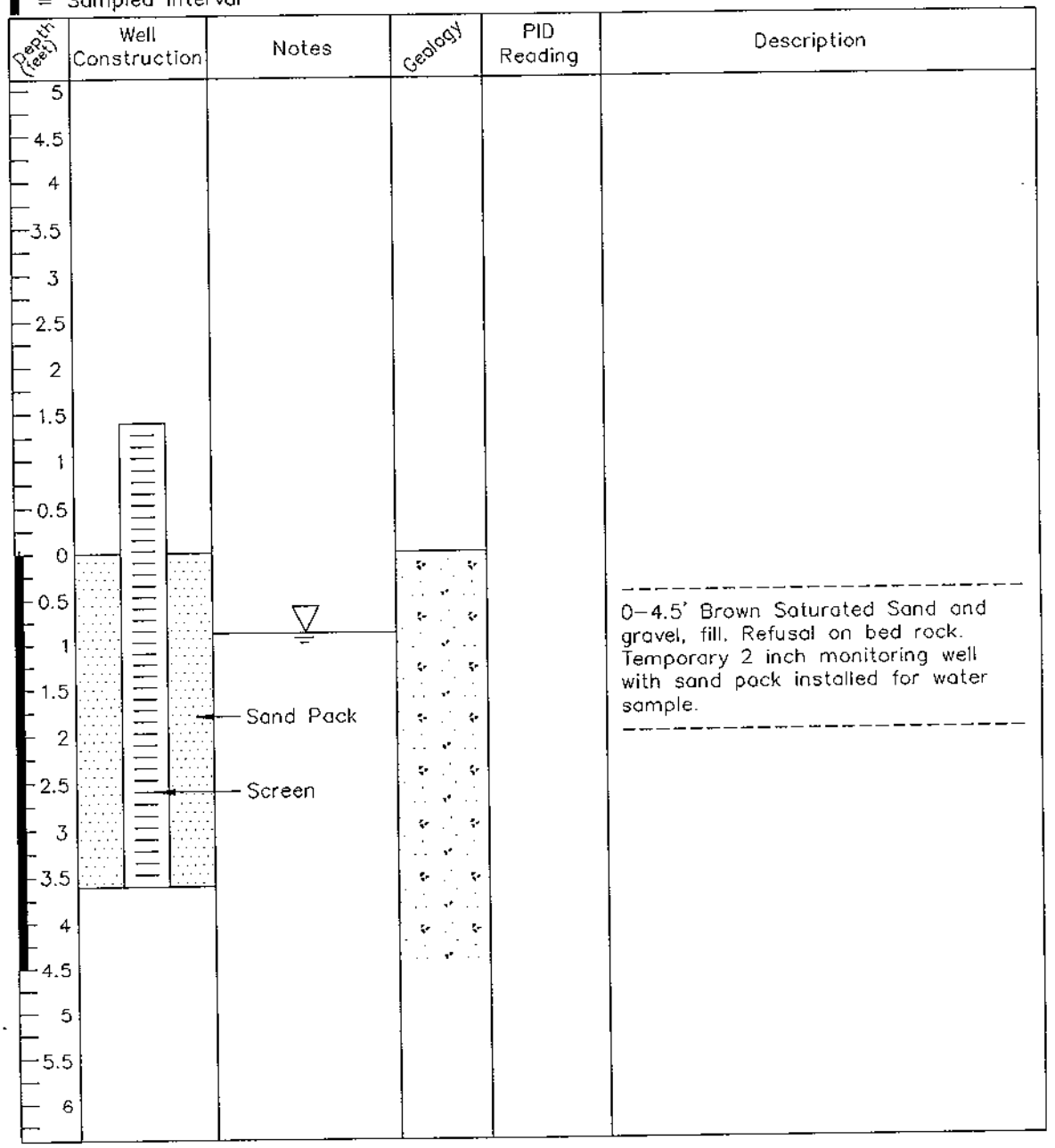
Project: Parrish
Location: Peru, VT
Job # 1-1669-1
Logged By: TRO
Date Drilled: 5/06/98
Driller: TRO
Drill Method: Lil. Beaver

Casing Type: PVC
Casing Diameter: 2.0 in.
Casing Length: 5.0 ft.
Screen Type: PVC Slot
Screen Diameter: 2.0 in.
Screen Length: 5.0 ft.
Slot Size: 0.010

Total Pipe: 5.0 ft.
Stick Up: 1.4 ft.
Total Hole Depth: 4.5 ft.
Well Guard Length: 0.0 ft.
Initial Water Level: 0.9 ft.
Surface Elevation:
T.O.C. Elevation:

▌ = Sampled Interval

Sheet 1 of 1



The Johnson Company, Inc.
Environmental Sciences and Engineering
100 State Street
Montpelier, Vermont 05602

DRILLING LOG
WELL # TMW-2

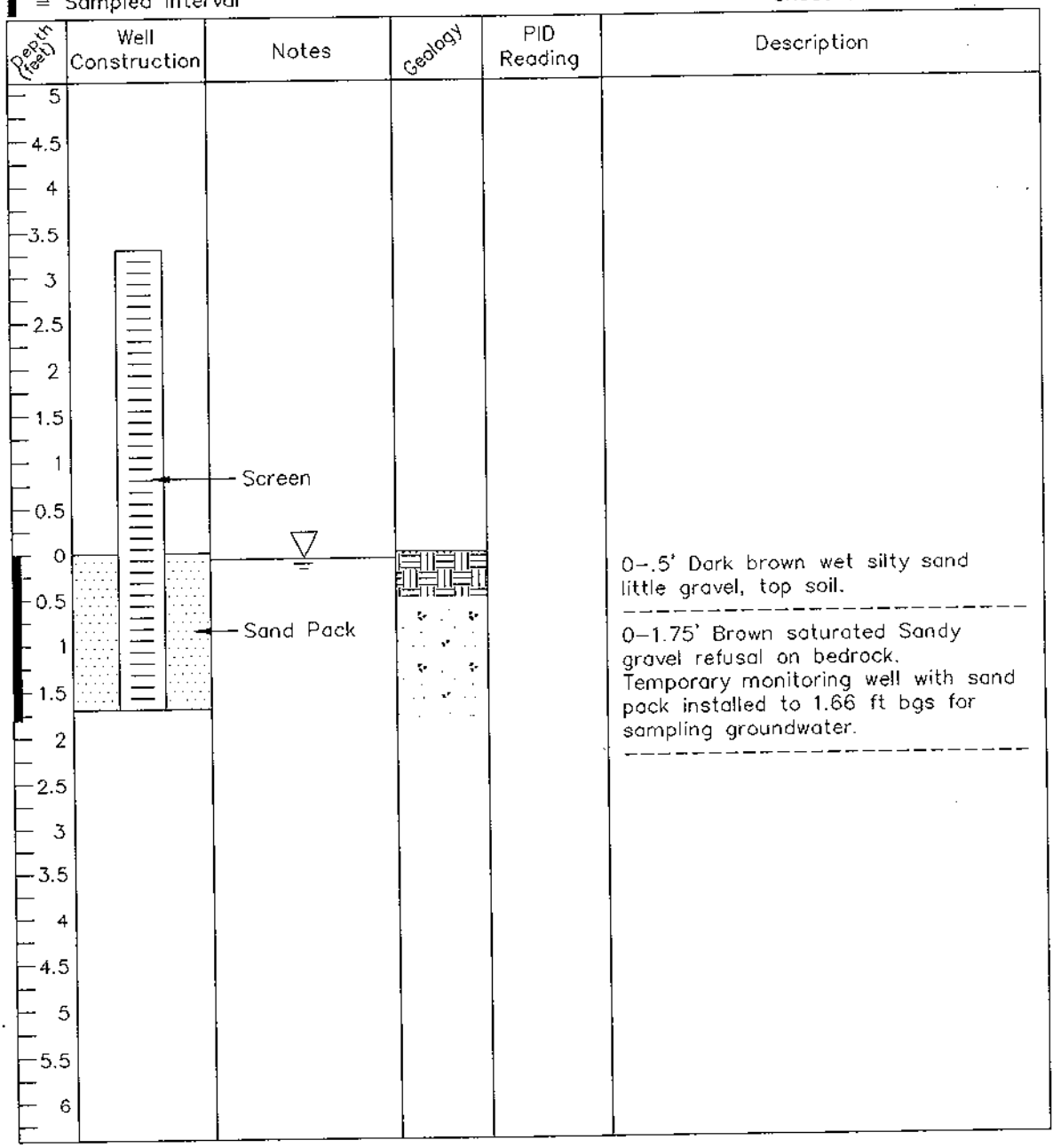
Project: Parrish
Location: Peru, VT
Job # 1-1669-1
Logged By: TRO
Date Drilled: 5/06/98
Driller: TRO
Drill Method: Lil. Beaver

Casing Type: PVC
Casing Diameter: 2.0 in.
Casing Length: 5.0 ft.
Screen Type: PVC Slot
Screen Diameter: 2.0 in.
Screen Length: 5.0 ft.
Slot Size: 0.010

Total Pipe: 5.0 ft.
Stick Up: 3.3 ft.
Total Hole Depth: 1.8 ft.
Well Guard Length: 0.0 ft.
Initial Water Level: 0.1 ft.
Surface Elevation:
T.O.C. Elevation:

▌ = Sampled Interval

Sheet 1 of 1



The Johnson Company, Inc.
Environmental Sciences and Engineering
100 State Street
Montpelier, Vermont 05602

DRILLING LOG
WELL # TMW-3

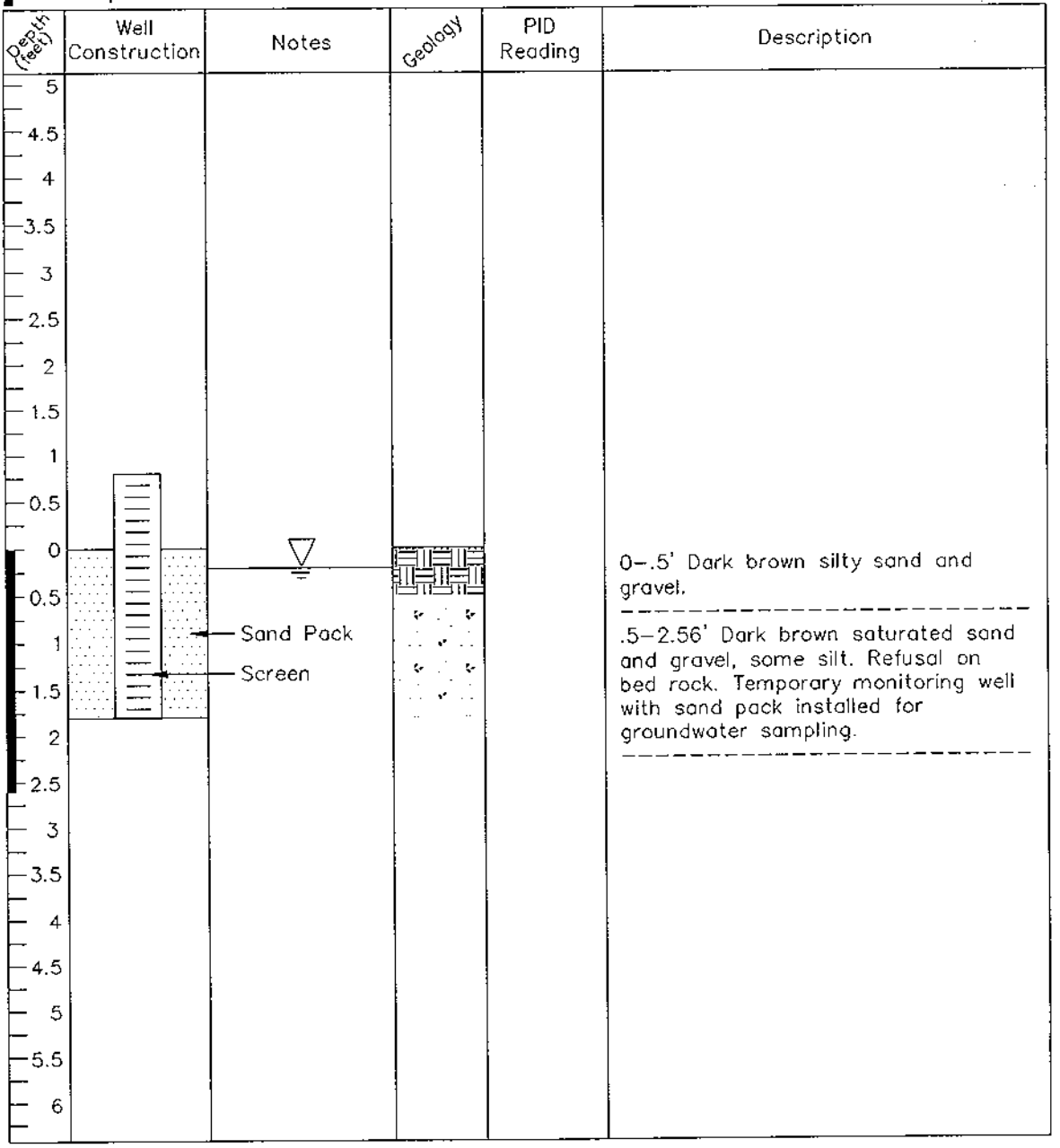
Project: Parrish
Location: Peru, VT
Job # 1-1669-1
Logged By: TRO
Date Drilled: 5/06/98
Driller: TRO
Drill Method: Lil. Beaver

Casing Type: PCV
Casing Diameter: 2.0 in.
Casing Length: 2.6 ft.
Screen Type: PCV Slot
Screen Diameter: 2.0 in.
Screen Length: 2.6 ft.
Slot Size: 0.010

Total Pipe: 2.6 ft.
Stick Up: 0.8 ft.
Total Hole Depth: 1.8 ft.
Well Guard Length: 0.0 ft.
Initial Water Level: 0.2 ft.
Surface Elevation:
T.O.C. Elevation:

■ = Sampled Interval

Sheet 1 of 1



The Johnson Company, Inc.
Environmental Sciences and Engineering
100 State Street
Montpelier, Vermont 05602

DRILLING LOG
WELL # TMW-4

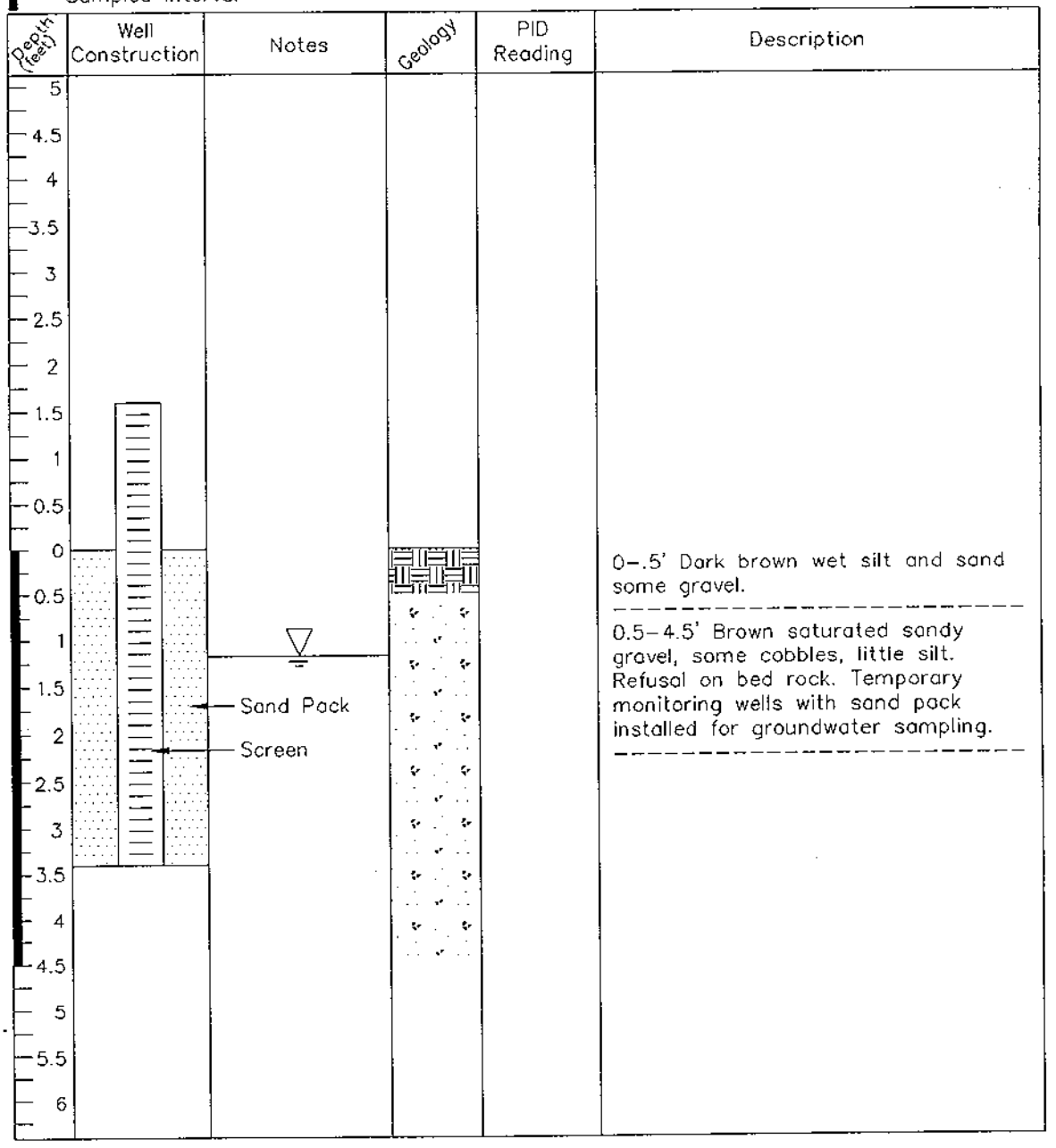
Project: Parrish
Location: Peru, VT
Job # 1-1669-1
Logged By: TRO
Date Drilled: 5/06/98
Driller: TRO
Drill Method: Lil. Beaver

Casing Type: PVC
Casing Diameter: 2.0 in.
Casing Length: 5.0 ft.
Screen Type: PVC Slot
Screen Diameter: 2.0 in.
Screen Length: 5.0 ft.
Slot Size: 0.010

Total Pipe: 5.0 ft.
Stick Up: 1.6 ft.
Total Hole Depth: 4.5 ft.
Well Guard Length: 0.0 ft.
Initial Water Level: 1.2 ft.
Surface Elevation:
T.O.C. Elevation:

▌ = Sampled Interval

Sheet 1 of 1



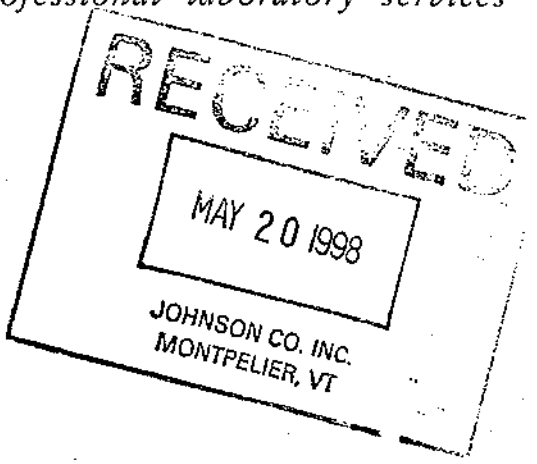
Attachment B

Groundwater Analytical Report

JRB 1-1669-1

eastern analytical

professional laboratory services



Jim Bowes
The Johnson Company
100 State St.
Montpelier, VT 05602

Subject: Laboratory Report

Eastern Analytical, Inc. ID:	12431 TJC
Client Identification:	1-1669-1 VT
Date Received:	05/08/98
Sample Quantity/Type:	6 aqueous

Dear Mr. Bowes :

Enclosed please find the laboratory report for the above identified project. All analyses were subjected to rigorous quality control measures to assure data accuracy. Unless otherwise stated, all holding times, preservation techniques, container types and sample condition adhered to EPA protocol.

The following standard abbreviations and conventions apply throughout all Eastern Analytical, Inc. reports:

- < = "less than" followed by the detection limit
- TNR = Testing Not Requested
- ND = None Detected, no established detection limit
- BRL = Below Reporting Limits

If you have any questions regarding the results contained within, please feel free to directly contact me, the department supervisor, or the analytical chemist who performed the testing in question. Unless otherwise requested, we will dispose of the sample(s) 30 days from the sample receipt date.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

Will Brunkhorst (by) 5/14/98

Will Brunkhorst, President Date

LABORATORY REPORT

Eastern Analytical, Inc. ID#: 12431

Client: The Johnson Company

Client Designation: 1-1669-1 VT

Volatile Organic Compounds

Client ID:	TMW-1	TMW-2	TMW-3	TMW-4	CSW-1	Trip Blank
Matrix:	aqueous	aqueous	aqueous	aqueous	aqueous	aqueous
Date Received:	5/8/98	5/8/98	5/8/98	5/8/98	5/8/98	5/8/98
DateAnalyzed:	5/12/98	5/12/98	5/13/98	5/12/98	5/12/98	5/12/98
Analyst:	VG	VG	VG	VG	VG	VG
Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Method:	8021	8021	8021	8021	8021	8021
MTBE	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	< 1	< 1	< 1	< 1	< 1	< 1
Toluene	< 1	< 1	< 1	< 1	< 1	< 1
Ethylbenzene	< 1	< 1	< 1	< 1	< 1	< 1
m,p-Xylene	< 1	< 1	< 1	< 1	< 1	< 1
o-Xylene	< 1	< 1	< 1	< 1	< 1	< 1

Approved By Clifford Chase, Volatile Organics Supervisor 5/19/98

LABORATORY REPORT

Eastern Analytical, Inc. ID#: 12431

Client: **The Johnson Company** Client Designation: **1-1669-1 VT**

Sample ID:	TMW-1	TMW-2	TMW-3	TMW-4	CSW-1
Analytical Type:	Sample	Sample	Sample	Sample	Sample
Matrix:	aqueous	aqueous	aqueous	aqueous	aqueous
Date Sampled:	5/6/98	5/6/98	5/6/98	5/6/98	5/6/98
Date Received:	5/8/98	5/8/98	5/8/98	5/8/98	5/8/98
Units:	mg/l	mg/l	mg/l	mg/l	mg/l
Date of Extraction/Prep:	5/11/98	5/11/98	5/11/98	5/11/98	5/11/98
Date of Analysis:	5/11/98	5/11/98	5/11/98	5/11/98	5/11/98
Analyst:	DJS	DJS	DJS	DJS	DJS
Method:	8100 Mod	8100 Mod	8100 Mod	8100 Mod	8100 Mod
Dilution Factor:	1	1	1	1	1
TPH (C9-C40)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Approved By: Timothy Schaper Organics Supervisor Timothy P. Schaper 5/13/98

eastern analytical, inc. 25 Chenell Drive / Concord, NH 03301 / TEL (603) 228-0525 / 1-800-287-0525
FAX (603) 228-4591 / E-Mail : front_office@eailabs.com

12431

CHAIN-OF-CUSTODY RECORD

Page ____ of ____

ITEM # for lab use only	SAMPLE I.D.	SAMPLING DATE / TIME	MATRIX (A - Air; S - Soil; GW - Ground Water; SW - Surface Water; DW - Drinking Water; WW - Waste Water; ☐ Other)	G-Grab, C-Comp	REQUESTED ANALYSES	# Of Containers	NOTES
1	TMW-1	5-6-98 13:50	GW	G	8021B-BTEX ☐ 602 (8020) = 2; TPH 8100 MOD ☐ LII ☐ LIII = 1	3	
2	TMW-2	13:30		G	8021B-BTEX ☐ 602 (8020) = 2; TPH 8100 MOD ☐ LII ☐ LIII = 1	3	
3	TMW-3	13:40		G	8021B-BTEX ☐ 602 (8020) = 2; TPH 8100 MOD ☐ LII ☐ LIII = 1	3	
4	TMW-4	13:45	GW	G	8021B-BTEX ☐ 602 (8020) = 2; TPH 8100 MOD ☐ LII ☐ LIII = 1	3	
5	CSW-1	5/6/98 14:00	GW	G	8021B-BTEX ☐ 602 (8020) = 2; TPH 8100 MOD ☐ LII ☐ LIII = 1	3	
6	DUP-1 DUP	5-6-98 13:50	GW	G	TPH 8100 MOD ☐ LII ☐ LIII = 1	1	QA/QC

Low level detection limits (check if needed and list in notes)

PRESERVATIVE: (H-HCl); N-HNO3; S-H2SO4; Na-NaOH — 8021B-BTEX ☐ 602 (8020) = X

PROJECT MANAGER : Jim Bowes

COMPANY : The Johnson Co.

ADDRESS : 100 State St.

CITY : Montpelier STATE VT ZIP 05602

PHONE : (802) 229-6277 (1 Pg) 5-7-98 EXT : 4600

FAX : 229-5876

E-MAIL : ____

PROJECT I.D. : 1-1669-1

STATE : NH ☐ OTHER VT

☐ Site historically contaminated ☐ Compliance Testing

RESULTS NEEDED BY

(enter preferred date) : ____

(Guaranteed rapid turnaround must have pre-approval)

NOTES : (i.e. Special Detection Limits, Billing Info. if different)

8021B per BO + labels
Parish on Labels
Trip Blank not on COC

QA / QC Reporting Level

☐ A ☐ B ☐ C

Quote # 1399

P.O. # ____

Sampler(s) : [signature] [signature]

Reporting Options

☒ Hard Copy

☑ Fax

Electronic :

☐ E-Mail ☐ Disk

FOR LAB USE ONLY

Custody Seal Intact ?

☐ Yes ☐ No

Cold ?

☒ Yes ☐ No

Relinquished by	Date	Time	Received by
[signature] [signature]	5-7-98	11:00	[signature]
Relinquished by	Date	Time	Received by
			5/8/98 1105
Relinquished by	Date	Time	Received by

(WHITE : *Original* YELLOW : *Lab Files* PINK : *Project Manager*)